IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No:	10/720,411
Applicant:	Richard L. Baer
Filed:	November 24, 2003
Title:	IMAGING SURVEILLANCE SYSTEM AND METHOD FOR EVENT DETECTION IN LOW ILLUMINATION
TC/A.U.:	2624
Examiner:	Alex Kok Soon Liew
Confirmation No.:	5096
Docket No.:	MICR-152US

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Office Action dated August 30, 2007, please amend the above-identified application as follows:

☐ **Amendments to the Specification** begin on page of this paper.

☒ **Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

☐ **Amendments to the Drawings** begin on page of this paper and include an attached replacement sheet(s).

☐ **Amendments to the Abstract** are on page of this paper. A clean version of the Abstract is on page of this paper.

☒ **Remarks/Arguments** begin on page 5 of this paper.

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) A surveillance system for detecting an event, comprising:

a sensor for capturing a current image using a first exposure time to produce sensor values representing said current image and capturing an event image using a second exposure time; and

an image processing system for performing a comparison of at least a portion of said sensor values representing said current image and spatially corresponding sensor values of a stored reference image captured using said first exposure time, said image processing system further for detecting said event in said current image based upon said comparison and instructing said sensor to capture said event image using the second exposure time;

wherein the first and second exposure times are, respectively, first and second time periods for exposing an array of pixels to capture a respective image to produce sensor values, ~~and~~

the second exposure time is less than the first exposure time, and

the respective image captured by the first exposure time includes several consecutive first image frames and the respective image captured by the second exposure time includes several consecutive second image frames and

the first image frames are captured entirely during the first time period and the second image frames are captured entirely during the second time period.

2. (Original) The surveillance system of Claim 1, wherein said image processing system is configured to perform said comparison by computing a difference value between at least a portion of sensor values representing said current image and spatially corresponding sensor values representing said reference image.

3. (Original) The surveillance system of Claim 2, wherein said image processing system is further configured to perform said comparison by determining whether said difference value exceeds a threshold, said image processing system being configured to detect said event when said difference value exceeds said threshold.

4. (Original) The surveillance system of Claim 1, wherein said image processing system is further configured to replace said reference image with said current image.

5. (Original) The surveillance system of Claim 1, further comprising:

an illumination source connected to said image processing system and operable in response thereto to provide artificial illumination during the capture of said event image.

6. (Original) The surveillance system of Claim 1, wherein said first exposure time is up to six seconds, and said second exposure time is up to 1/60 of a second.

7. (Original) The surveillance system of Claim 1, further comprising:

a storage medium for storing said event image.

8. (Original) The surveillance system of Claim 1, further comprising:

a transmission interface for transmitting said event image to an external security system.

9. (Original) The surveillance system of Claim 1, wherein said reference image and said current image are captured under an illumination level between one centilux and one lux.

10. (Currently Amended) A method for performing event detection within a surveillance system, the method comprising:

comparing a current image with a reference image, said current image and said reference image being captured using a first exposure time;

detecting an event based upon said comparing; and

capturing an event image using a second exposure time ;

wherein the first and second exposure times are, respectively, first and second time periods for exposing an array of pixels to capture a respective image to produce sensor values, ~~and~~

the second exposure time is less than the first exposure time, and

the respective image captured by the first exposure time includes several consecutive first image frames and the respective image captured by the second exposure time includes several consecutive second image frames and

the first image frames are captured entirely during the first time period and the second image frames are captured entirely during the second time period.

11. (Original) The method of Claim 10, wherein said comparing further comprises:

computing a difference value between at least a portion of sensor values representing said current image and spatially corresponding sensor values representing said reference image.

12. (Original) The method of Claim 11, wherein said comparison further comprises:

determining whether said difference value exceeds a threshold, said event being detected when said difference value exceeds said threshold.

13. (Original) The method of Claim 10, further comprising:

storing said current image as said reference image.

14. (Original) The method of Claim 10, further comprising:

in response to said detecting, providing artificial illumination during said capturing.

15. (Original) The method of Claim 10, further comprising:

transmitting said event image to an external security system.

16. (Original) The method of Claim 15, further comprising:

transmitting said event image over a wireless connection to said external security system.

17. (Currently Amended) A method for capturing an image of an event by a surveillance system, the method comprising:

comparing a current image with a reference image, said current image and said reference image being captured using a first exposure time;

detecting an event based upon said comparing;

in response to said detecting, providing artificial illumination; and

capturing an event image under the artificial illumination using a second exposure time ;

wherein the first and second exposure times are, respectively, first and second time periods for exposing an array of pixels to capture a respective image to produce sensor values, ~~and~~

the second exposure time is less than the first exposure time, and

the respective image captured by the first exposure time includes several consecutive first image frames and the respective image captured by the second exposure time includes several consecutive second image frames and

the first image frames are captured entirely during the first time period and the second image frames are captured entirely during the second time period.

18. (Original) The method of Claim 17, wherein said comparing further comprises:

computing a difference value between at least a portion of sensor values representing said current image and spatially corresponding sensor values representing said reference image.

19. (Original) The method of Claim 18, wherein said comparison further comprises:

determining whether said difference value exceeds a threshold, said event being detected when said difference value exceeds said threshold.

20. (Original) The method of Claim 17, further comprising:

capturing said reference image and said current image under an illumination level between one centilux and one lux.

Remarks/Arguments:

Claims 1-20 stand rejected.

Section 103 Rejections:

Claims 1-4, 6-8, 10-13, 15, 16, 18 and 19 have been rejected as being obvious in view of Kakarala, Shima and Hori. Applicant respectfully submits that this rejection is overcome for the reasons set forth below.

Amended claim 1 now includes features which are not suggested by the cited references, namely:

- a sensor for capturing a current image using a first exposure time ...
- and capturing an event image using a second exposure time ...
- an image processing system for performing a comparison ... of ... said current image and ... a stored reference image captured using the first exposure time ...
- the image processing system further ... detecting the event in the current image based upon the comparison and instructing the sensor to capture the event image;
- wherein the first and second exposure times are, respectively, first and second time periods for exposing an array of pixels to capture a respective image to produce sensor values,
- the second exposure time is less than the first exposure time, and
- **the respective image captured by the first exposure time includes several, consecutive first image frames and**
- **the respective image captured by the second exposure time includes several consecutive second image frames and**
- **the first image frames are captured entirely during the first time period and the second image frames are captured entirely during the second time period.**

Basis for amended claim 1 may be found, for example, at page 8, lines 3-15. As described, sensor 20 captures current image 35a using a long exposure time (e.g., up to approximately six seconds) with a long exposure time, the temporal resolution moving objects within the captured image deteriorates due to image blurring resulting from the motion. However, the temporal resolution is sufficient to detect the occurrence of motion relative to reference image 140 taken prior to current image 35a.

As also described, for example, at page 9, lines 3-5, once an event is detected, the event detection module 120 activates illumination source 150 and instructs exposure controller 320 to reduce the exposure time and instructs sensor 20 to take one or more subsequent event images 35b.

Amended claim 1 now further recites that the image captured by the first exposure time includes several consecutive first image frames. Similarly, the image captured by the second exposure time includes several consecutive second image frames. Furthermore, amended claim 1 explicitly recites that the first image frames are captured entirely during the first time period and the second image frames are captured entirely during the second time period.

As amended, it is now clear that the invention has a first exposure time and a second exposure time, where each of the exposure times includes several consecutive image frames. Furthermore it is now clear that the first exposure time and the second exposure time are each periods for capturing several consecutive first image frames and several consecutive second image frames, respectively.

The Office Action at page 4, second paragraph, states that the first exposure time shown in FIG. 1 of Kakarala captures images for a period of time until an event is detected. It only takes an instance to send the event notification, because the time it takes to wait for an event to happen is usually longer than the time it takes for the system to send the event notification. Kakarala, however, does **not** disclose features of amended claim 1, namely, a sensor for capturing a current image using a first exposure time, and capturing an event image using a second exposure time, where after performing a comparison between the current image and a stored reference image, the processor instructs the sensor to detect an event in the current image using a second exposure time.

Furthermore, Kakarala does **not** suggest a first exposure time and a second exposure time which are each defined as time periods for exposing an array of pixels to capture a respective image to produce sensor values. Further still, Kakarala does **not** suggest a second exposure time which is less than a first exposure time.

Shima discloses capturing event images after an event is detected. Shima, however, does **not** disclose any of the above described features which are missing from Kakarala.

Hori, the newly cited reference, discloses first and second exposure times which are, respectively, first and second time periods for exposing an array of pixels. Hori, however, describes a system which produces **alternating bright and dark fields of an image**. For example, at column 7, lines 55-57, Hori describes a bright field buffer and a dark field buffer which provide a bright frame and a dark frame, as shown in FIG. 2. Furthermore, Hori describes in FIG. 1 alternating bright and dark fields, indicated as 413 and 414. Furthermore, at column 9, lines 28-35, Hori describes a system in which bright fields of frames and dark fields of frames are transferred in an alternating manner. As described, a bright image is followed by the transfer of a **digital dark image that was captured immediately following the bright image**. Furthermore, Hori describes at column 9, lines 44-47, dual images which are displayed as a composite image in the sense that one half of the 480 lines of pixels, making up each displayed frame, is a duplicate of a preceding line. This mode of reading-in each scanned line of an interlaced image twice is necessary in order to meet the frame requirements of a monitor.

Accordingly, Hori does **not** suggest the amended features of claim 1, namely, that the respective image captured by **the first exposure time includes several consecutive first image frames and the respective image captured by the second exposure time includes several consecutive second image frames**. Furthermore, Hori does **not** suggest the feature of amended claim 1 which requires that **several first image frames be captured**

entirely during the first time period and several second image frames be captured entirely during the second time period.

Favorable reconsideration is respectfully requested for amended claim 1. Although not the same, independent claims 10 and 17 have been amended to include features similar to amended claim 1. These independent claims are, therefore, not subject to rejection in view of the cited references for the same reasons set forth for amended claim 1.

Dependent claims 2-9 depend from amended claim 1. Dependent claims 11-16 depend from amended claim 10. Dependent claims 18-20 depend from amended claim 17. These dependent claims are, therefore, not subject to rejection in view of the cited references for at least the same reasons set forth for amended claim 1. Favorable reconsideration is respectfully requested.

Conclusion

This application is now in condition for allowance.

Respectfully submitted,

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JJJ/mc

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